

DEPARTMENT OF PHYSICS
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October 28, 1994

Ms. Angela Evan
NASA Goddard Space Flight Center
Code 286.1
Greenbelt, MD 20771

Final Technical Report
for NASA Grant NAG5-1983

Dear Ms. Evan:

During the period June 1992 through April 1994 we were supported in part by NASA grant NAG5-1983 to analyze and interpret ROSAT X-ray observations of a number of globular clusters. The principal research activities in this project have centered around our studies of 10 globular clusters (9 observed in March through September 1992 [AO2], and one observed in March 1993 [AO3]). Our results have been published in a paper entitled "ROSAT Observations of Nine Globular Clusters" by S. Rappaport, D. Dewey, A. Levine, & L. Macri (ApJ, 1994, 423, 633). (A copy is enclosed.) In this work we report (i) the discovery of low-luminosity X-ray sources associated with the clusters Pal 2 and NGC 6304; (ii) upper limits on the luminosities of X-ray sources in 7 other clusters; and (iii) an interpretation of the 25 low-luminosity X-ray sources detected to date in 13 different globular clusters in terms of tidal capture binaries containing a white dwarf.

In addition to the above studies, the grant NAG5-1983 helped to support several theoretical studies related to X-ray binaries. These include: "Predictions of a Population of Cataclysmic Variables in Globular Clusters" by R. Di Stefano, & S. Rappaport (ApJ, 1994, 423, 274); "Formation and Evolution of Luminous Supersoft X-Ray Sources" by S. Rappaport, R. Di Stefano, & J.D. Smith (ApJ, 1994, 426, 492); "Ionization Nebulae Surrounding Supersoft X-Ray Sources" by S. Rappaport, E. Chiang, T. Kallman, & R. Malina (ApJ, 1994, 431, 237); and "Episodic Mass Transfer in Binaries With X-Ray Heating" by A. Harpaz, & S. Rappaport (ApJ, 1994, 434, 283).

During the course of this project, two undergraduate students (Eugene Chiang and Lucas Macri) also derived some support from this grant while working on the research described above as part of the M.I.T. Undergraduate Research Opportunities Program.

Sincerely,

Saul Rappaport

Saul Rappaport
Professor of Physics

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